Non-specific protein injections have already found considerable favor in the treatment of the arthritides. It would seem from our experience that it offers great possibilities in the treatment of any acute infectious disease, but particularly of one with an unknown etiology and consequently no possibility of producing an immune animal serum.

PNEUMONIA AS A COMPLICATION OF EPIDEMIC INFLUENZA.

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Introduction. The material for this study was formed from 39 cases of pneumonia occurring in the course of the epidemic of influenza in Flanders and northern France during the fall of 1918. The patients, fourteen of whom were British and twenty-five of whom were American soldiers, were sent to this hospital, in Boulogne, between October 25 and December 7, 1918, from twelve widely separated field hospitals and casualty clearing stations. The most striking feature of the series was that 25 of the 39 cases had lobar pneumonia due to pneumococcus infection. This diagnosis was supported by bacteriological evidence in the form of positive blood cultures. The high mortality allowed confirmatory evidence as to the character of the lesion at necropsy.

Various papers on the pandemic of influenza which occurred during the fall months of 1918 have shown that lobar pneumonia was seldom found. A few studies, however, reported it as of frequent occurrence. It is evident that the nature of the pulmonary changes varied in different districts and countries. According to Horder's[1] observations in St. Bartholomew's Hospital, London, the respiratory manifestations extended from laryngitis and tracheitis through bronchitis to lobular and lobar pneumonia. But the characteristic feature, and one which was seldom absent in any severe case, was a condition of capillary bronchitis with intense pulmonary congestion. Cases of true bronchopneumonia did not seem common. On the other hand, Christian,[2] at the Peter Bent Brigham Hospital, Boston; Keegan,[3] at the United States Naval Hospital, Chelsea; Nuzum, Pilot, Stangl, and Bonar,[4] in Cook County Hospital, Chicago; Friedlander, McCord, Sladen, and Wheeler,[5] at Camp Sheridan, Ohio; Synnott and Clark,[6] at Camp Dix, New Jersey; Abrahams, Hallows and French,[7] in the Connaught

Hospital, Aldershot, and Blanton and Irons,[8] at Camp Custer, Michigan, found bronchopneumonia in their fatal cases and believed that true lobar pneumonia was uncommon in association with influenza. In contrast to this opinion, Muir and Wilson,[9] of the Third and Fourth Scottish General Hospitals, Glasgow, found lobar pneumonia, or a combination of lobar and bronchopneumonia, in 34 per cent. of 26 necropsy examinations; Hall, Stone, and Simpson,[10] at Camp Logan, Texas, made a diagnosis of lobar pneumonia in all but 50 of 416 cases of influenza-pneumonia. These cases, under observation between September 13 and October 8, 1918, are the only ones reported in which lobar pneumonia was the chief complication.

A great diversity of bacteriological findings has also been characteristic of the epidemic. Keegan[3] recovered the bacillus of influenza from the lungs at necropsy in 82.6 per cent. of 23 cases of post-influenzal bronchopneumonia, and McIntosh,[11] in the London Hospital, isolated the same organism in 68 per cent. of 19 fatal cases of bronchopneumonia. These results are in striking contrast to the work of others. Blanton and Irons[8] recovered streptococci from 451 of 740 sputa and pneumococcus 148 times. The streptococcus was also the chief organism isolated by Fildes, Baker and Thompson[12] at the Royal Naval Hospital, Haslar, England and by Strouse and Bloch[13] in Michael Reese Hospital, Chicago. The pneumococcus, on the other hand, is described as the predominating organism by Nuzum, Pilot, Stangl, and Bonar,[4] who recovered this organism from the lungs at necropsy in 75 per cent. of 34 cases, and by Friedlander, McCord, Sladen and Wheeler,[5] who found it regularly in the sputum of 2000 cases having pneumonia and from cultures at necropsy in 53.3 per cent. of a large series of fatal cases. Similar results were obtained by Hall, Stone and Simpson,[9] who isolated the pneumococcus from the sputum of 302 pneumonia patients. Other writers, notably Abrahams, Hallows and French,[7] placed emphasis upon a diplostreptococcus as a chief secondary invader. Whittingham and Sims,[14] of the Central Hospital and Military Hospital, Hampstead, England, found Micrococcus catarrhalis the predominating organism in 34 per cent. of 50 consecutive cases of influenza, and finally Fletcher,[15] in the University War Hospital, Southampton, England, and others have found the meningococcus in pure cultures. Blood cultures, by many of the workers mentioned, have yielded negative or indifferent results.

In brief, experience has shown that bronchopneumonia has been the common severe pulmonary complication of influenza, whereas lobar pneumonia has been one of infrequent occurrence. Furthermore, the etiology of the pneumonia has been attributed to many organisms, among them the bacillus of influenza, streptococcus, pneumococcus, diplostreptococcus, Micrococcus catarrhalis and meningococcus.

METHODS OF STUDY. Many patients having influenza were admitted to this hospital during the epidemic. The frequent complication of lobar and bronchopneumonia necessitated the isolation and individual care of those who were found to be most seriously ill. The patients in this series represent, therefore, a selected group of especially severe cases. They were observed in an isolation ward of thirteen beds, each bed being in a separate cubicle. Special nurses were on duty day and night, and all persons who came in contact with the patients wore protecting gowns and masks. In every case a careful history and physical examination was made upon admission and daily chest examinations were made thereafter. No special treatment was given except for the routine administration of digitalis and the forcing of fluids.

The cases were studied more closely by the following laboratory methods:

1. *Blood Cultures.* Whenever possible a blood culture was made in every case upon admission to the ward. If negative, it was repeated once or twice in several cases. Ten centimeters of blood were obtained by venepuncture and inoculated into a large tube containing 50 cm. of 1 per cent. glucose broth. The cultures were examined at the end of twenty-four and forty-eight hours. The pneumococcus, which was the only organism recovered from the blood stream, was identified by the following characteristics:

(*a*) Greenish culture in blood bouillon.

(*b*) Diffuse cloudiness in bouillon with no flocculent precipitate and very little settling.

(*c*) Pneumococcus-like colonies on blood agar.

(*d*) Bile solubility (not always tested).

(*e*) Typing with sera distributed by the Rockefeller Institute.

2. *Sputum and Lung Cultures.* Stained smears of sputum were examined in all cases in which specimens were obtainable, and attempts were made to isolate the pneumococcus by Avery's[16] method. Lung cultures were made in a few cases in which sputum was unobtainable.

3. *Necropsy Examinations.* Necropsy examinations were made as soon as possible after death. Cultures from this material were not extensively studied.

LOBAR PNEUMONIA. The histories of the 25 cases of lobar pneumonia were essentially the same as in the cases of bronchopneumonia The common story was one of sudden onset of fever, marked prostration and generalized aching pains characteristic of influenza. Many cases of influenza were seen in the hospital, in which recovery from the acute attack had occurred, but which developed pneumonia within one to four days afterward. Three such cases are included in this series. In the majority of cases, however, no history of an afebrile period preceding the pneumonia could be obtained. The diagnosis of lobar pneumonia was made upon the physical signs of consolidation in the lungs. Such signs were usually found at the time of the first examination. Other factors considered were the temperature curve, toxemia, course of the disease and character of the sputum.

In 8 surviving cases signs of frank consolidation were found as follows: Right lower lobe, 5; both lower lobes, 1; right lower and right upper lobes, 1; both lower and right upper lobes, 1; in 17 fatal cases the lobes involved were: Right lower lobe, 1; left lower lobe, 4; both lower lobes, 6; both lower and right upper lobes, 1; both lower and left upper lobes, 1; left lower and left upper lobes, 1; right lower and right upper lobes, 1; In the 2 remaining cases there were signs of consolidation in one side and diffuse variable signs characteristic of bronchopneumonia in the other.

The temperature curve during the height of the disease was well sustained, usually between 102° and 105°. Crisis occurred in 1 case and the temperature fell in seven others by lysis. Probably crisis did not occur in more of the cases because of the extension of pneumonia to new lobes or to concurrent bronchopneumonia. There was, as well, a notable failure of the lobes which were first affected to show signs of resolution even after ten to fourteen days of complete consolidation. Such a spreading lesion with slow resolution indicated either a low resistance to the invading organism or an extremely virulent infection.

All of the patients showed severe prostration, rapid respirations and cyanosis of varying degrees. Delirium was a frequent symptom.

The sputum in the majority of cases was characteristic. Early in the disease it was blood-stained, semigelatinous, mucoid pus, which persisted in certain cases but usually changed to a purulent excretion. Extension of pneumonia to new lobes was often first noticed by the reappearance of blood-tinged mucus. None of the cases produced an unusual amount of sputum and in several instances no specimens could be obtained.

Of 25 cases of lobar pneumonia, 17 died and 8 lived. The average duration of pneumonia in the surviving cases was nine days; in the fatal cases, twelve days. These figures are only approximately correct, since it was impossible to determine the exact date of the onset of pneumonia except in a few cases. Other points of clinical interest were: The occurrence of laryngitis in 2 cases; jaundice in 1 case; sterile pleural effusion in 2 cases; empyema in 1 case; pleural pain at some time in 10 cases; 2 cases of purulent pericarditis and 4 cases of empyema found at necropsy were not diagnosed during life.

BRONCHOPNEUMONIA. The diagnosis of bronchopneumonia was made in 14 cases upon the physical signs, as in the other series; but other data, such as the temperature curve, toxemia, sputum and the course of the disease were included. The cases were in no respect different from those described as bronchopneumonia by other writers, with the exception that very little tendency to hemorrhage was observed.

One of the characteristics of the lung signs was the great variation noticed from day to day. For varying periods in some cases there was complete absence of pathological signs. Suppressed breathing at the bases was common. Moist, sticky, consonating rales were often present, and frequently patches of bronchial breathing in the interscapular spaces or near the scapular angles. During the closing days of the disease, in a few fatal cases, consolidation of one or both lobes was noted. In 6 cases no bronchial breathing was heard and in 8 it was found at some time during the course of the disease.

In several cases a high temperature curve persisted until death, but, as a whole, variations of as much as 5° between the morning and evening temperatures were not uncommon. In one case under observation for nine days the temperature did not exceed 100.8° until forty-eight hours before death, when it registered 102°.

As a whole the fatal cases showed a greater degree of cyanosis than was seen in the lobar type. The pulse-rates and the respiratory rates tended to be greater than in the cases having lobar pneumonia. The great depression of the majority of the patients from the beginning foretold a prognosis of a grave nature.

A characteristic sputum was produced in which, among other organisms, the bacillus of influenza was uniformly present. Grossly the sputum was pale green, purulent, nummular and at times was raised only after severe coughing. Cough was more frequent, severe and distressing than in the cases of lobar pneumonia, Signs of pleurisy were uncommon.

The total number of cases was 14; 11 died and 3 recovered. The average duration of the fatal cases was fifteen days; of those living, seventeen days. Other clinical facts to be noted were: The occurrence of laryngitis in 3 cases, pleural pain in 1 case and epistaxis in 1 case. At necropsy, dry adhesive pericarditis was found in 1 case, pleurisy in 2 cases and empyema in 1 case.

CASE HISTORIES. The protocols of 2 cases of lobar pneumonia and 2 cases of bronchopneumonia are given to illustrate in detail some of the differences already noted.

CASE I.—W. B., American soldier, aged twenty years, was admitted October 31, 1918, with a history of sudden onset, four days previously, of chilly sensations, headache and generalized aching pains, particularly in the right shoulder. On November 2 he was found to have consolidation of the right upper lobe and on the following day signs of the same process throughout the left lower lobe. He was then moderately cyanotic and dyspneic and raised sticky blood-stained sputum. On November 4 his chest showed marked dulness over the right back, increasing to flatness at the base where tactile fremitus was absent. There was very little movement of the right chest. Bronchial breathing was heard over the upper lobe, but gradually decreased in intensity and became absent at the base. The left chest presented dulness from the midscapula to the base, bronchial breathing, increased voice sounds and some moist rales. The right chest was tapped in the posterior axillary line but only 1 cm. of bloody fluid was obtained, which, on culture, grew pneumococcus Type II. Blood culture was negative.

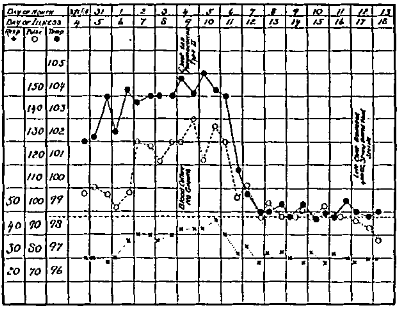

Chart I.

The temperature since October 30 had remained continuously between 103° and 105°; the pulse was usually 110 to 120 and respirations 30 to 45. On November 7 the general condition of the patient was greatly improved, the temperature having dropped to normal during the preceding thirty-six hours. There was less dulness at the right base. On November 8 he complained of pleural pain in the left chest, but no rub was heard. There was still frank consolidation of the left lower lobe. Throughout the right chest breathing was decreased and there were a few fine scattered moist rales. Fluoroscopy showed no evidence of fluid. By November 12 the right chest was rapidly clearing up. The left base however, was flat to the level of the scapular angle, with absent tactile fremitus and breath sounds. This base was tapped and 420 cm. of clear straw-colored fluid removed, which was sterile on culture. On November 15 the chest signs had disappeared except for some dulness and changed breathing at the left base, and the patient was in fine condition.

Case II.—A. F. S., American soldier, aged twenty-six years, was admitted November 25, 1918. He had been ill for six days with headache and general malaise and had had a severe cold. Recently he had developed cough and pain in the right side of the chest. The chest examination was negative except for a few fine pleural rales at the right base. On the day after entry, however, there was moderate dulness over the right upper lobe posteriorly, with increased vocal fremitus and bronchovesicular breathing. The left lung was clear. The sputum was blood-streaked. On the following day there was complete consolidation of the right lower lobe and signs of involvement of the lower one-third of the right upper lobe. There was some dulness over the left lower lobe but no change in the breath sounds. The sputum was sticky and rusty. The patient was cyanotic, but his condition was still good. Blood culture gave a positive growth of pneumococcus Type I. By November 29 there was intense bronchial breathing over the left base posteriorly and in the axilla. On the right the breath sounds came through less well. The sputum consisted chiefly of blood-streaked mucus. The temperature had been maintained at 103° or above. Cyanosis gradually increased, the pulse-rate and respiratory rate steadily mounted and the patient died December 2.

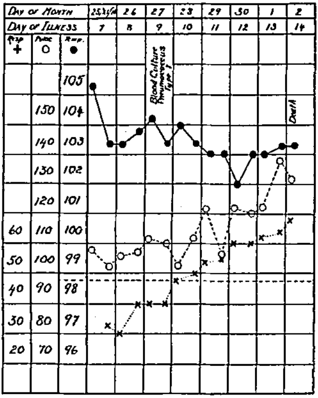

Chart II.

At necropsy a small amount of purulent fluid was found in the left pleural cavity, while in the right there was a moderate amount of more purulent fluid, with shaggy pleural exudate. The upper lobe of the right lung was completely consolidated; the cut surface was reddish-gray. The right lower lobe presented some edema and a considerable exudate of blood and fibrin. Sections of the tissue sank in water. The left lower lobe showed a generalized fibrinous pleurisy. There was complete consolidation, the cut surface being deep red in color. The upper lobe was edematous but presented no consolidation. Cultures from the lungs developed pneumococcus Type I.

CASE III.—T. F., British soldier, aged twenty-three years, was admitted November 10, 1918. He had been taken suddenly ill three days before with intense headache, generalized aching pains and hot and cold sensations. He had a little cough and complained of loss of appetite. His bowels were constipated.

At the right base posteriorly there was impaired resonance, with decreased breathing and scattered, moist rales were heard in both lungs. The patient was transferred to the isolation ward on November 20. His temperature had fluctuated daily from the date of entrance; the respirations had ranged from 24 to 36 and the pulse-rate from 90 to 100. The chest now showed moderate dulness at the right base posteriorly. There were numerous fine moist rales in both bases and on the right pleural rales were heard after cough. The sputum was light, greenish-yellow, airless pus, containing the bacillus of influenza and Micrococcus catarrhalis. A blood culture was negative. By November 25 the temperature was still fluctuating, but the general condition had improved. There was dulness on the right from the spine of the scapula to the base, with distant breathing and a few sticky, moist rales. Many similar rales were heard in the left lower lobe. On November 27 the left lung was clear, dulness on the right had increased and breath sounds at the base were faint. A chest tap proved negative. Fluoroscopy showed nothing remarkable on the left side, but on the right there was increased density, slight at the apex, increasing to the base, but not suggesting fluid. The diaphragmatic movements were restricted on both sides. On December 1 the lungs were clearing up and the patient was rapidly improving. The temperature had been normal since November 28.

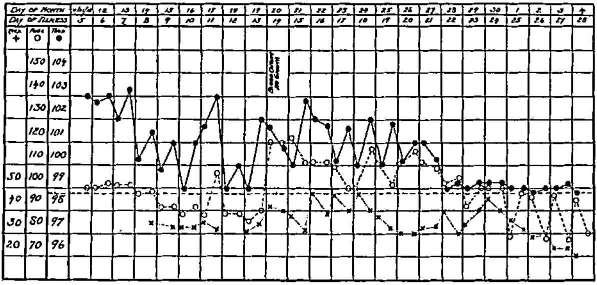

CHART III.

CASE IV.—G. F. R., American soldier, aged twenty-eight years, was admitted November 6, 1918, with a diagnosis of gunshot wound of the right deltoid, from which the foreign body had been removed at a casualty clearing station. The wound was in good condition. Four days after entry he was taken suddenly ill with fever, headache and pains across the chest. By November 14 he had developed a cough, coryza and mild laryngitis. The lungs were negative. A blood culture made November 15 was negative. On November 16 the patient was very cyanotic, had increased respirations and raised purulent sputum. The lungs showed no dulness anteriorly. Posteriorly there was impaired resonance over both sides, with diminished breathing and moist rales at both bases. There was no bronchial breathing. A second blood culture was negative. On November 17 there was bronchial breathing high in the left axilla and increased voice sounds. At the left base posteriorly there were many moist rales. On November 18 a third blood culture was negative. On November 19 the chest showed moderate general dulness over both sides posteriorly, more marked on the left. There were moist rales from the apices to the bases, but no bronchial breathing. The sputum was grass-green-colored pus containing the bacillus of influenza. On November 20 the temperature recorded was normal, but the respirations were still 50 and pulse 120. The laryngitis had increased and the chest examination showed scattered moist rales but no bronchial breathing. By November 25 the man was extremely prostrated, very cyanotic, delirious and restless. There were signs of consolidation over the entire right lower lobe and bronchial breathing in the left axilla. Death occurred three days later.

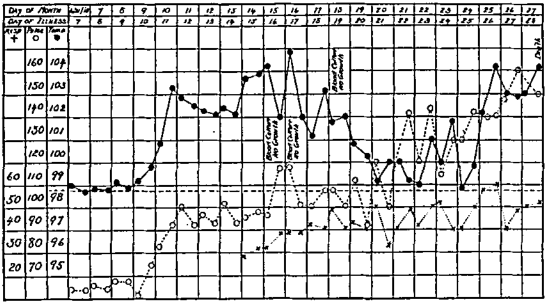

CHART IV.

Necropsy examination showed an extensive bronchopneumonia throughout both lungs. The lesions were numerous. The process apparently was many days old, since the areas immediately around the bronchioles were gray, but a more recent extension had effected almost complete consolidation in certain areas. There was no pleurisy.

CLINICAL SUMMARY. The cases of lobar pneumonia therefore were distinguished clinically from those having bronchopneumonia by the high even temperature curve, blood-tinged mucoid sputum, evidence of consolidation in one or more lobes early in the disease, pleurisy and by a shorter clinical course. The cases of bronchopneumonia showed fluctuating temperature curves produced a purulent sputum, developed indefinite or variable signs in the lungs, usually without pleurisy, and had a longer clinical course.

BACTERIOLOGY. The main bacteriological study of the cases was confined to blood cultures. The results are shown in Table I.

TABLE I.—BLOOD CULTURES IN REFERENCE TO DISEASE.

	Number positive.	Number negative.	Per cent. positive.	Per cent. negative.
Lobar pneumonia	13	9	59	41
Bronchopneumonia	0	11	0	100

It is noteworthy that 59 per cent. of 22 cases of lobar pneumonia had a septicemia in contrast to the negative findings in all of 11 cases of bronchopneumonia. This difference in the two types of cases is emphasized because it suggests a distinctive etiology for each type and confirms the clinical classification.

That the pneumococcus septicemia was not due to an agonal invasion of the blood stream is shown by the following facts: One positive culture was obtained fourteen hours before death, three were obtained twenty-four hours before death and the remainder between two and five days before death.

The types of pneumococcus which were found in blood cultures are shown in Table II.

TABLE II.—TYPE OF PNEUMOCOCCUS IN BLOOD CULTURES.

	Type I.	Type II.	Type IV.
Number of cases	1	11	1

In 7 additional cases of lobar pneumonia the type of pneumococcus was determined from the sputum by Avery's method or from cultures obtained by lung puncture. They showed 4 instances of pneumococcus Type II and 3 of pneumococcus Type IV. In 20 cases of lobar pneumonia, therefore, the types of pneumococcus obtained were: Type I, 1 case; Type II, 15 cases; Type IV, 4 cases. The high incidence of Type II is not explained.

In 14 cases of bronchopneumonia, on the other hand, cultures of the sputum contained pneumococcus only twice (pneumococcus Type I once and Type IV once), despite repeated attempts to grow the organism in other cases.

In this connection it should be mentioned that the bacillus of influenza was seen in films from the sputum of a few cases of the lobar pneumonia group in addition to the pneumococcus. In the bronchopneumonia cases, however, the bacillus of influenza was always found in large numbers and the pneumococcus was either found rarely or not recognized at all.

MORTALITY STATISTICS. The total mortality of approximately 70 per cent. in each group shown in Table III indicates the severity of the pneumonia under consideration.

TABLE III.—MORTALITY WITH REFERENCE TO DISEASE.

	Living.		Dying.	
	Number.	Per cent.	Number.	Per cent.
Lobar pneumonia	8	32.0	17	68.0
Bronchopneumonia	4	28.5	10	71.5

This high rate for the series resulted in part from the plan of selecting the cases for isolation that were most gravely ill. Moreover, as the mortality in both types of pneumonia was nearly the same, these observations suggest that the primary epidemic disease preceding the pneumonia altered the threshold of resistance to any secondary invaders to a considerable degree.

TABLE IV.—MORTALITY WITH REFERENCE TO NATIONALITY.

	Lobar pneumonia.					Bronchopneumonia.				
	Total cases.	Living.	Per cent.	Dying.	Per cent.	Total cases.	Living.	Per cent.	Dying.	Per cent.
British .	10	5	50	5	50	4	2	50	2	50
American .	15	3	20	12	80	10	2	20	8	80

Table IV shows that of the 14 British patients, 10, or 71.5 per cent., had lobar pneumonia, and 4, or 28.5 per cent., had bronchopneumonia. Of the 10 cases of lobar pneumonia 5 died, a mortality of 50 per cent.; and of the 4 cases of bronchopneumonia, 2 died, a mortality of 50 per cent. Of the 25 American patients, 15, or 60 per cent., had lobar pneumonia, and 10, or 40 per cent., had bronchopneumonia. Of the 15 patients having lobar pneumonia, 12 died, a mortality of 80 per cent., while of the 10 patients having bronchopneumonia, 8 died, a mortality of 80 per cent. In the total series, therefore, lobar pneumonia due to pneumococcus infection occurred with about the same frequency in both nationalities, while the mortality for both lobar and bronchopneumonia was 30 per cent. greater for the American patients than for the British.

The mortality in the cases of lobar pneumonia having positive and negative blood cultures is shown in Table V.

TABLE V.—MORTALITY WITH REFERENCE TO POSITIVE BLOOD CULTURES.

	Of cases with positive cultures.		Of cases with negative cultures.	
	Number.	Per cent.	Number.	Per cent.
Living	1	7.7	6	66
Dying	12	92.3	3	33

Of 13 cases with pneumococcus septicemia 12 died, while of 9 cases with negative blood cultures 6 survived. The fatal outcome of the cases having positive blood cultures, particularly pneumococcus Type II, is in accord with experiences of other observers.

PATHOLOGY. *Pathological Findings.* The gross appearance of the pneumonic lungs suggested a division into the following groups:

1. Pure bronchopneumonia: The lesions were discrete, even in an advanced stage. Between the lesions the lung tissue was emphysematous. Pleurisy was not often concurrent.

The individual lesion commonly began as a small hemorrhagic area about an inflamed bronchiole. As it grew in size fibrin was added and the lesion projected slightly above the surface, becoming easily palpable. The leukocytes increased and it became more gray. The final stage was from 1 to 2 mm. to 8 or 9 cm. in diameter, with a well-defined margin. The cut edges of the bronchi usually appeared thickened and projected sharply above the surface. Occasionally there was softening in the center of the nodule.

2. Rapidly Spreading Bronchopneumonia: The patches were large and ill-defined, often becoming confluent. In an early stage the lesion appeared as a large area having a dark red, "beefy" look, feeling smooth and non-granular. Even when the whole lobe was involved by the confluence of patches it did not have the massive appearance of a true lobar pneumonia, and a lumpy feeling was evident on palpation. Often small areas containing air or reddish fluid were found.

Usually there was no pleurisy in these cases. If present, it was without appreciable exudate. Two cases in our series were classified as of this type.

3. Pure Lobar Pneumonia: In these cases the lungs were atypical. They were large, massive and evenly firm on palpation. In distinction from the two previous types there was almost invariably a marked fibrinopurulent pleurisy over the affected lobe. This pleural lesion was lacking in the same case over lobes which were not involved in the lobar process, even though they presented marked bronchopneumonia.

The cut surface showed even consolidation, some in the stage of red hepatization, some in the gray stage.

4. In a certain number of cases the lobar pneumonias gave evidence of a previous bronchopneumonic process in the same lobe. Immediately about the bronchi there were areas showing older, harder lesions of a red or gray color.

5. In many cases the lobes not involved in the lobar process showed a bronchopneumonic process. It seemed probable that in some of these cases there was also a bronchopneumonic process in the lobe with lobar pneumonia, which was obscured by the lobar consolidation.

6. In 3 cases a lobe or lobes were edematous, with red fluid and airless, but not consolidated.

Associated Processes: Marked bronchitis was nearly always present. Pericarditis was noted in 3 cases. In 1 case it was of the dry adhesive type and concurrent with bronchopneumonia. In the 2 other cases it was purulent and associated with lobar pneumonia. The pericardial exudate contained a pure culture of pneumococcus in each of the 2 latter cases. In 1 case the pneumococcus on being typed proved to be Type II, which was the same as in the blood culture and lung culture.

Empyema: In 4 cases empyema occurred with lobar pneumonia, in 1 case with bronchopneumonia. Marked collapse occurred only in the bronchopneumonic case.

Pleural Exudate: In 6 cases, all lobar pneumonia, there was excess of pleural fluid, slightly cloudy and reddish brown.

SUMMARY. 1. A series of 39 cases of pneumonia complicating "influenza" is reported, in which lobar pneumonia occurred in 25, or 64 per cent., and bronchopneumonia in 14, or 36 per cent. The cases were selected, on account of their apparent severity, from many cases that were admitted to the hospital at the same time.

2. The cases of lobar pneumonia were characterized by lung signs typical of consolidation, high sustained temperature curves, blood-tinged mucoid sputum and a shorter course than the cases of bronchopneumonia.

3. The cases of bronchopneumonia showed indefinite and variable lung signs, fluctuating temperature curves, purulent sputum and tended to run a more prolonged course.

4. The total mortality of 70 per cent. was the same in both types of pneumonia, but was 30 per cent. higher for the American patients than for the British.

5. Positive blood cultures were obtained in 13 of 22 cases, 59 per cent., of lobar pneumonia. No organism except the pneumococcus was recovered, Type II occurring in 84.6 per cent. of the cases. The sputum in the cases examined microscopically contained pneumococcus, usually in large numbers, while in a few cases the bacillus of influenza was also found.

6. No positive blood cultures were obtained in 11 of 14 cases of bronchopneumonia. The sputum always contained the bacillus of

influenza in large numbers, although a few contained the pneumococcus as well.

7. The pathological picture at necropsy, in general, was that typical of lobar pneumonia in some cases, bronchopneumonia in others and combinations of both types in a few cases.

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